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NOTE

A NEW SPECIES OF *DILLENIA* (ANGIOSPERMS: DILLENIACEAE) FROM THE EASTERN GHATS OF ANDHRA PRADESH, INDIA

J. Swamy, L. Rasingam, S. Nagaraju & Pooja R. Mane

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A new species of *Dillenia* (Angiosperms: Dilleniaceae) from the Eastern Ghats of Andhra Pradesh, India

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The genus *Dillenia* L. is represented by ca. 60 species distributed from Madagascar and Seychelles to the Fiji Islands and India to southeastern Asia and Australia (Hoogland 1952; Mabberley 2008). In India the genus is represented by seven species (Majumdar 1993), of which four are reported from Andhra Pradesh (Pullaiah et al. 2018). *Dillenia andamanica* C.E. Parkinson and *D. bracteata* Wight are strictly endemic to the Andaman & Nicobar Islands and the Western Ghats, respectively (Singh et al. 2015). Initially, *D. bracteata* Wight was also reported from Sri Lanka based on Wight collections, but, while revising the family, Wadhwa (1996) ruled out the distribution in Sri Lanka and stated that 'both specimens are wrongly labelled'.

While working on the project 'Non Detrimental Finding Studies (NDFs) on Red Sanders (*Pterocarpus santalinus* L.f.) tree in India', a *Dillenia* species with white flowers was collected from the Chittoor District of Eastern Ghats, Andhra Pradesh. After critical studies and comparison with all known species, the material is recognized as a novelty that markedly differs from all known species of *Dillenia*. Hence, it is described here as a new species.

Dillenia tirupatiensis J. Swamy & Rasingam sp. nov. (Image 1; Figure 1 & 2)

Type: 8858 (Holotype CAL; Isotypes BSID), 09.v.2018, Musalipedu Beat, 13.617222°N & 79.647778°E, 802m, Papanaidupet Section, Tirupati Range, Chittoor East Forest Division, Chittoor District, Andhra Pradesh, coll. J. Swamy.

Diagnosis: *Dillenia tirupatiensis* is allied to *D. hookeri* by its inflorescence, bracteoles, and shape of seeds but differs by its elliptic-obovate leaves (oblong-oblancoate in *D. hookeri*), crenate margins (entire to slightly dentate in *D. hookeri*), 8–10 mm long pedicel (15–40 mm in *D. hookeri*), 8mm long bracteoles (20–35 mm in *D. hookeri*), white flowers (yellow in *D. hookeri*), ovules that are in four rows at the base and two rows at the apex of the placenta (two rows in *D. hookeri*) and styles that are erect and parallel for up to 3mm before spreading (spreading from the base in *D. hookeri*) (Table 1).

Description: Deciduous tree 2–5 m high; bark grayish; branches sympodial, younger ones 3.5–8 mm thick, densely tomentose, the hairs on older branchlets appressed, glabrescent. Leaf scars clasping about half of branch, subfalcate, with emarginate upper margin,

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Competing interests: The authors declare no competing interests.

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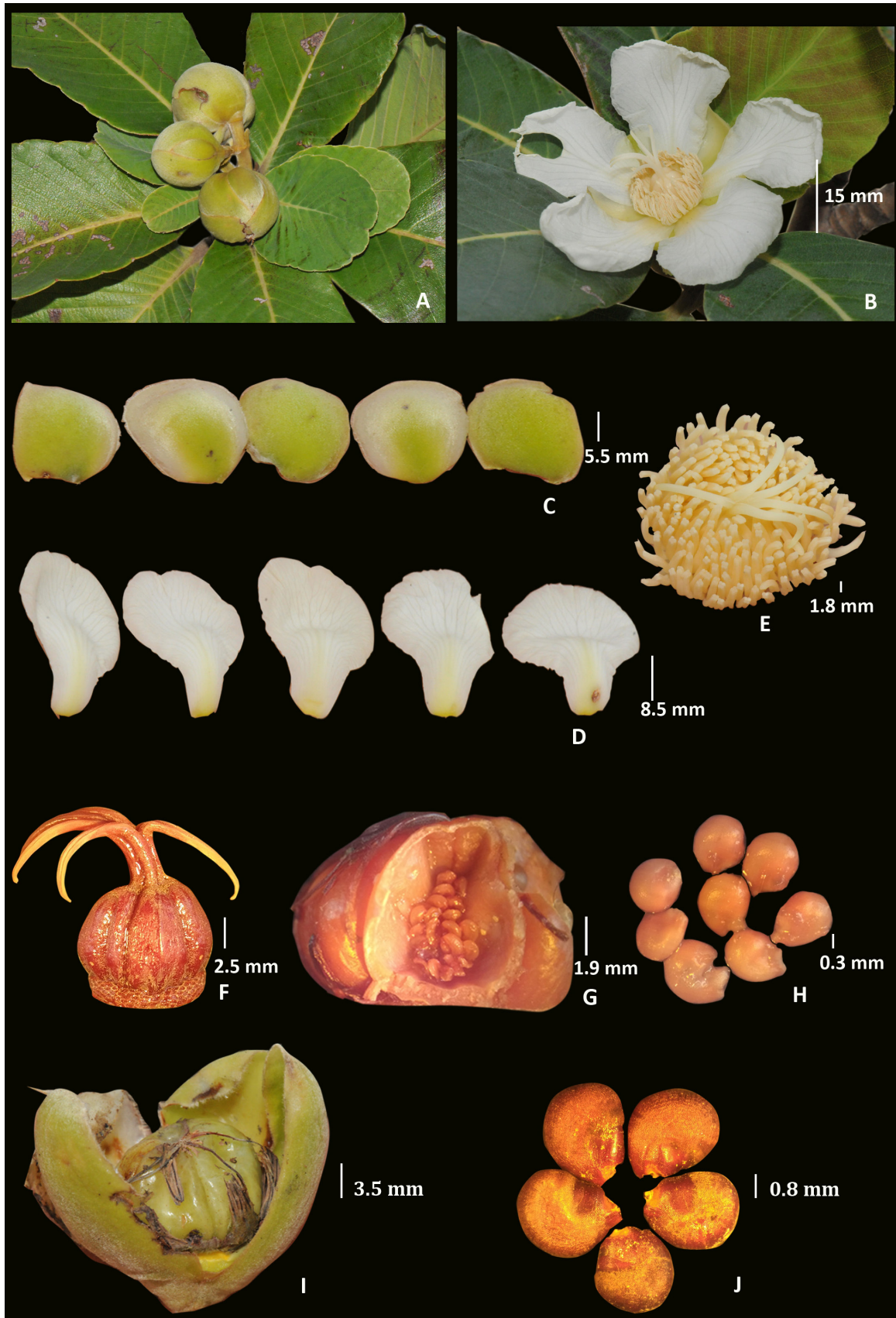


Image 1. *Dillenia tirupatiensis* J. Swamy & Rasingam sp. nov. A—inflorescence | B—flower | C—sepals | D—petals | E—stamens & pistil | F—pistil | G—carpel with 2–4 rows of ovules | H—ovules | I—pseudocarp | J—seeds. Photos by J. Swamy

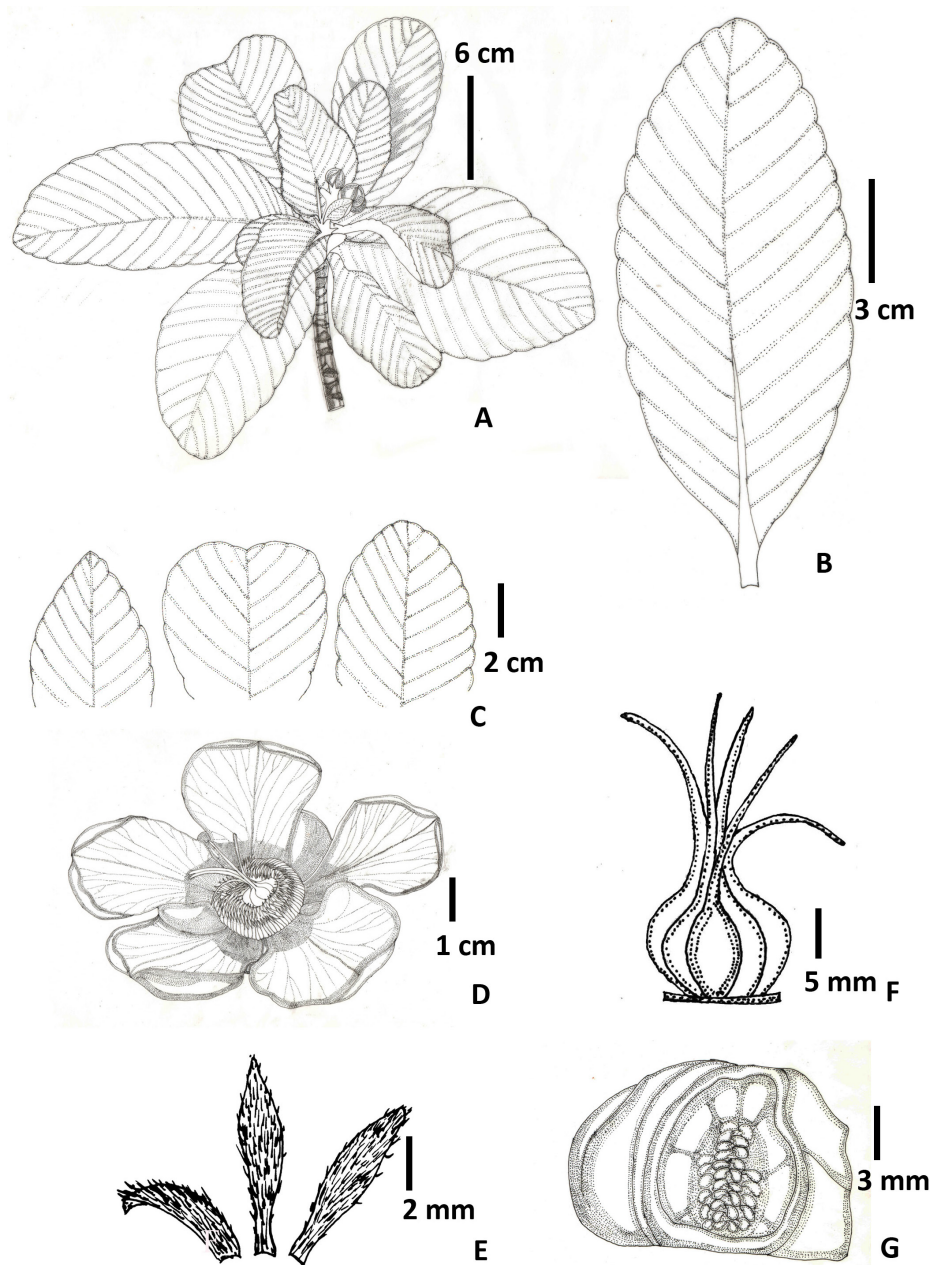


Figure 1. *Dillenia tirupatiensis* J. Swamy & Rasingam sp. nov. A—flowering branch | B—leaf | C—apices of leaves | D—flower | E—bracteoles | F—gynoecium | G—carpel with 2–4 rows of ovules. Illustration by Pooja R. Mane

with 10–13 leaf traces about middle. Leaves elliptic, obovate, 4–13 (–22) × 3–7 (–12) cm, cuneate or acute at base, crenate along margin, rounded, obtuse, retuse, emarginate, acute, rarely acuminate at apex, glabrescent above, densely tomentose beneath; lateral nerves slightly curving upward, ending in margin, 13–32 on either side of midrib, more densely tomentose and with hairs on nerves. Petiole 8–20 mm long, 1–4 mm broad, densely sericeous. Flowers terminal, solitary (rarely 2–3-flowered), up to 6cm across, on racemes 8–16 mm

long. Pedicel 4–10 mm long, 1.5–2 mm broad, thickened to 3mm at apex in bud, densely sericeous. Bracteoles 3, sessile, lanceolate, ca. 8 × 3 mm, decurrent at base, ciliate along margin, truncate or acute at apex, densely sericeous. Sepals 5, oblong-oval, 22–28 × 8–15 mm, rounded at apex, densely sericeous on upper surface, glabrous on lower surface, faintly 11–14-nerved from base. Petals 5, white, 25–45 × 14–40 mm, obovate, narrowed towards base, entire along margin, rounded at apex, glabrous, 9–12 nerved from base. Stamens ca.

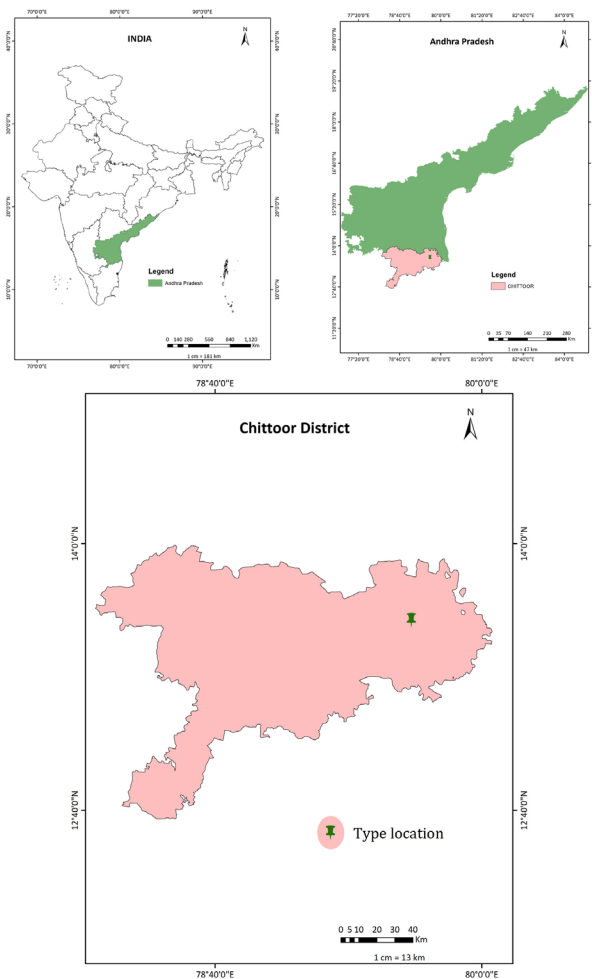


Figure 2. Type locality of *Dillenia tirupatiensis* J. Swamy & Rasingam sp. nov. in India.

Table 1. Morphological comparison of *Dillenia hookeri* and *D. tirupatiensis* J. Swamy & Rasingam sp. nov.

Characters	<i>Dillenia hookeri</i>	<i>Dillenia tirupatiensis</i>
Leaves	Oblong to oblanceolate	Elliptic, obovate
Leaf base	Acute	Cuneate, acute
Leaf margin	Entire to slightly dentate	Crenate
Leaf apex	Rounded, sometimes slightly acuminate	Rounded, obtuse, retuse, emarginate, acute and rarely acuminate
Flower	Yellow	White
Pedice	15–40 mm	8–10 mm
Bracteoles	20–35 × 7–10 mm	8 × 3 mm
Sepals	15mm long	22–28 mm long
Carpels	6–7, 5 × 1.5 mm, glabrous in each with 18 ovules in two rows	5, 7.5 × 5.5 mm, glabrous, in each with ca. 12–24 ovules in basally four rows and apically two rows
Style	Spreading, cylindrical, ca. 11 × 4 mm	Lower 2.5–3 mm parallel, above this spreading, ca. 6 × 0.5 mm

180 arranged in rows, slightly curved in bud, all of about same length, 6.6–7 mm long; filaments ca. 2mm long, ca. 0.3 mm broad; anthers 4.6–5 mm long, ca. 0.8mm broad, rounded or slightly emarginate at apex, the thecae linear and opening by a pore near apex. Carpels 5, 5–7.5 × 3.5–5.5 mm, arranged around a conical receptacle, globular, ca. 10 × 12 mm, glabrous, each with 12–24 ovules; ovules obovoid to reniform, ca. 1 × 0.7 mm, glabrous, arranged in lower parts in 4 rows and in the upper part always in two rows; styles 5, parallel-jointed for lower 2.5–3 mm then spreading, ca. 6mm long, ca. 0.5mm broad. Pseudocarps indehiscent, globular, 12–16 × 16–18 mm (excluding enclosing sepals). Carpels 10–12 × 4–5 mm, 1–3 seeded. Seeds obovoid to reniform, 3–4 mm diam., smooth, dark reddish-brown.

Flowering and fruiting: March–August.

Habitat: Rare in dry deciduous forest, growing from 600–900 m elevation in association with *Phoenix loureiroi*, *Pterocarpus santalinus*, *Syzygium alternifolium*, *Chloroxylon swietenia*, *Anogeissus latifolia* etc.

Distribution: India, Andhra Pradesh, Chittoor District, Chittoor East Forest Division, Tirupati Range, Papanaidupet Section, Musalipedu Beat (Figure 2).

Etymology: The specific epithet is derived from the type locality Tirupati, a famous temple town in the Chittoor district of Andhra Pradesh.

Conservation status: This species is so far known only from the type locality and a total of five mature individuals in the surrounding areas. Extensive explorations, however, are needed in nearby locations and similar habitats to know the exact extent of occurrence of this species, for an accurate evaluation of its threat status. Therefore, the threat status is provisionally evaluated here as “Data Deficient (DD)” using the IUCN Red List Categories and Criteria Version 3.1 (IUCN 2012).

Notes: *Dillenia bracteata* is related to *D. tirupatiensis* by its leaf shape and size, equal stamens and arrangement of styles but differs by having 0–2 small bracteoles, 2–6-flowered racemes, yellow flowers, and ovules arranged in 2 rows in the carpels. *Dillenia retusa* reported from Karnataka, Tamil Nadu, and Sri Lanka, is also similar to the new species by its inflorescence, and flower colour but differs by its fewer lateral nerves in the leaves, ebracteolate flowers, unequal stamens, and styles spreading from the base.

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Key to the *Dillenia* species in India

- 1a. Flowers white 2
- 1b. Flowers yellow 4
- 2a. Flowers more than 12cm across *D. indica*
- 2b. Flowers less than 12cm across 3
- 3a. Bracteoles absent; innermost stamens distinctly larger than outer ones, with apical part reflexed outward over the later...*D. retusa*
- 3b. Bracteoles present; stamens all about same length, only slightly curved in bud *D. tirupatiensis*
- 4a. Anther thecae opening with longitudinal slit; flowers up to ca. 5cm across 5
- 4b. Anther thecae opening with apical pore; flowers ca. 10–12 cm across 6
- 5a. Flowers up to 3cm across; pedicels without bracteoles *D. pentagyna*
- 5b. Flowers 4–5 cm across; pedicels with bracteoles *D. scabrella*
- 6a. Stamens equal; styles parallel up to 3mm at base, above spreading; carpels 5 *D. bracteata*
- 6b. Stamens unequal; styles spreading from base; carpels 6–12 7
- 7a. Petiole up to 2cm long; outer sepals ca. 15 × 12 mm, inner ones ca. 18 × 14 mm; carpels 6–8 *D. andamanica*
- 7b. Petiole 3–6.5 cm long; outer sepals 25 × 18 mm, inner ones 30 × 20 mm; carpels 10–12 *D. aurea*

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